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After Example 2: Calculate  $f \cdot g$  and  $f \div g$   
using  $f(x) = x^2 - 5x + 6$  and  $g(x) = x - 3$

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for the store? Explain.

$$(g \circ f)(x)$$

$$f(30) = .8(30)$$

$$= 24$$

$$g(x) = 24 - 5$$

$$f \circ g = 19$$

$$(f \circ g)(x)$$

$$g(30) = 30 - 5$$

$$= 25$$

$$f(25) = .8(25)$$

$$= 20$$

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**Composite applications.**

1. A car dealer offers a 10% discount off the list price  $x$  for any care on the lot. At the same time, the manufacturer offers a \$2000 rebate for purchase of a car.
  - a. Write a function  $f(x)$  to represent the price after the discount.
  - b. Write a function  $g(x)$  to represent the price after the \$2000 rebate.
  - c. Suppose the list price of a care is \$18,000. Use a composite function to find the price of the care if the discount is applied before the rebate.
  - d. Suppose the list price of the care is \$18,000. Use a composite function to find the price of the care if the rebate is applied before the discount.
2. Suppose your teacher offers to give the whole class a bonus if everyone passes the next math test. The teacher says she will (1) give everyone a 10-point bonus and (2) increase everyone's grade by 9% of their score.
  - a. Let  $x$  represent the original test scores. Write statements (1) and (2) as functions  $f(x)$  and  $g(x)$ , respectively.
  - b. Explain the meaning of  $f(g(x))$ . Evaluate  $f(g(75))$ .
  - c. Explain the meaning of  $g(f(x))$ . Evaluate  $g(f(75))$ .
  - d. Does  $g(f(x)) = f(g(x))$ ?

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Find composite function given an input value (number or variable)

$f(x) = x - 2$        $g(x) = x^2$   
 $(g \circ f)(-5) =$   
 $f(-5) = -5 - 2 = -7$   
 $g(-7) = (-7)^2 = 49$   
 $(f \circ g)(-5) =$   
 $g(-5) = (-5)^2 = 25$   
 $f(25) = 25 - 2 = 23$   
 $(f \circ g)(-2) =$   
 $g(-2) = (-2)^2 = 4$   
 $f(4) = 4 - 2 = 2$   
 $(g \circ f)(4) =$   
 $f(4) = 4 - 2 = 2$   
 $g(2) = 2^2 = 4$   
 $(f \circ g)(x) =$   
 $g(x) = x^2$   
 $f(x^2) = x^2 - 2$   
 $(f \circ g)(x) = x^2 - 2$   
 $(g \circ f)(x) =$   
 $f(x) = x - 2$   
 $g(x - 2) = (x - 2)^2 = x^2 - 4x + 4$   
 $(g \circ f)(x) = x^2 - 4x + 4$

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$2x^2 + 3x - 2$   
 $3x^2 - 2$   
 $2x^2 + 3x - 2x - 3$   
 $x(2x+3) - 1(2x+3)$   
 $(2x+3)(x-1)$   
 $n) \frac{f(x)}{g(x)} = \frac{(2x+3)(x-1)}{(x-1)}$        $D: x \neq 1$

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$17. \frac{2x^2 + x - 3}{x - 1}$   
 $\frac{2x^2 - 2x + 3x - 3}{x - 1}$   
 $2x(x-1) + 3(x-1)$   
 $(x-1)(2x+3)$        $D: x \neq 1$   
 $\frac{x-1}{(x-1)(2x+3)}$        $x \neq 1, x \neq -3/2$

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